Jameco Part number 116943

# CONTROLLING THE WORLD WITH YOUR PC

3.5" Disk included

PAUL BERGSMAN

Jameco Part number 116943

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## Introduction

I've been teaching electronics for over twenty years, and have been asked repeatedly since the introduction of the Apple IIe computer to interface real world devices with computers. Groups as varied as model train clubs, students developing science fair projects, actors involved with amateur stage productions, and the Cub Scouts have all requested circuits to connect a computer with a real world device. For the last four years, I have been using this knowledge to design museum and trade show exhibits.

This book is based on my experience, and is meant to be a bridge between programmers and hardware hackers. Some folks are a whiz at programming, but know little about the mechanical and electronic aspects of computers. They know how to "talk" to a standard external device, like a printer, but would be lost if asked to write a program to make a computer turn on the kitchen coffee pot at 7:00 a.m. every weekday morning. Others have expertise with a soldering iron. They can interconnect IC chips to perform incredible tasks, but have little understanding of how to get a high level computer language to control their creations.

This book is a union of these two camps. It is a sourcebook for ideas on how to control and monitor real world devices with your IBM/IBM compatible computer. Most of the circuits presented connect to the parallel printer port. This approach provides--pardon the pun--portability.

The *de facto* printer port standard is the IBM PC/IBM compatible PC printer port (the Apple Macintosh has chosen to follow the beat of a different drummer, unfortunately). These machines currently represent 87% of the PC market. The circuits in this book can plug into any IBM PC/PC compatible printer port. The schematics all use the DB-25 (25 pin) female connector present on IBM type parallel printer ports. Full technical data on the parallel printer port can be found in the hardware reference for your computer. Appendix F of this book describes how to expand the printer port to input or output 24 bits of data. Appendix D also shows how to use the IBM PC's game port as a data input, although this is very slow and not recommended in most circumstances. The parallel printer port does not vary greatly between different makes of PCs. Some manufacturers may elect to omit some control lines, but each parallel port pin has the same meaning on every computer. Every computer language provides routines to "talk" with the printer. This enables computers to interface to myriad electronic devices.

Most people think the printer port can only output 8-bit data. Not true! The printer port also contains nine input lines. Parallel data entry greatly reduces hardware circuit overhead because many IC chips are designed to directly interface to an 8-bit data port. Though some newer computers are being shipped with bidirectional 8-bit printer ports, most are not. Most printer ports have eight data output bits, five input control bits, and another four bidirectional control bits. This book shows you a variety of methods for inputting *and* outputting 8-bit data from any parallel printer port.

Many IC devices are advertised as "microprocessor compatible." That means they need minimal hardware to connect to a parallel data port. To use the serial port, additional circuitry would have to be added. This would require more circuit board space, increased project cost, and additional assembly time. More parts means there are more things that can go wrong, so reliability suffers. And, since the computer must convert this serial data back to its parallel format, the circuit's speed is reduced by over 500%! This book includes material explaining some special applications that justify serial port interfacing. For the majority of your needs, however, the parallel port is the most cost and time efficient way to go.

When I am asked to give a lecture, I travel to my destination with a small briefcase containing circuit boards and a disk of program listings. Upon arrival, I plug the host's printer cable into my circuit boards, connect power, and boot the software. Quick, efficient, portable--it's that simple.

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**$35.00** **Electronics/Computers**

(Price may vary outside U.S.)

# Connect Your Personal Computer To The Real World...

...and make it do useful work like controlling stepping motors, monitoring fluid levels, or switching appliances on and off! Interfacing your PC to other devices and circuits isn't always easy; it requires a mix of hardware and software skills few people have. But Paul Bergsman has done the hard work for you in this terrific book for users of IBM compatible PCs.

You won't need to modify your PC to use this book. Each of the circuits in this book connects directly to the parallel printer port of your PC! Each also comes complete with a circuit diagram and listings for control software written in Pascal, C, and BASIC. And the accompanying disk contains full source code in all languages plus compiled (.EXE) files.

**Here are some of the applications you'll find in this book:**

- controlling stepper and servo motors
- generating audio tones and speech
- converting input voltages to binary values
- driving high power loads and DC relays
- converting DTMF tones to binary values

You'll find plenty of information about adapting applications for your particular needs. Nine appendices cover such topics as using your PC's game port for input, expanding the parallel port for 24-bit I/O, serial port interfacing, and bidirectional printer port use.

All circuits and software have been tested in actual applications. These are practical, useful applications, not technological "stunts." No matter what your interest in electronics and computing--as student, technician, teacher, or engineer--this collection of circuits and software is destined to become an indispensable part of your technical library!

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